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ABSTRACT

The Information Acquisition Preference Inventory was used to examine cognitive styles in relationship to students' use of study tasks and to assess subjects' preferred ways of learning and problem solving. The inventory, which has students rank words describing their own learning behavior, identifies four distinctive learning preference modes: concrete sequential (CS), concrete random (CR), abstract sequential (AS), and abstract random (AR). A study skills survey completed by 40 students enrolled in a college reading and study skills course indicated that the concrete sequential learner was predominant among the students sampled. Not only were 46% of the students exhibiting one learning preference (concrete sequential learners), but 79% of the double dominant learners had a CS mixture. As for study techniques, the greatest number of learners in all categories reported using personal schedules "sometimes," with the next largest number using schedules "almost always." Most students reported using the textbook study system "sometimes," and the Cornell note-taking method and mapping techniques "very little" or "never." Results also indicated that the concrete random learners used the study techniques somewhat more than did the other students. (Appendixes include the study skills survey and the Information Acquisition Preference Inventory.) (HOD)

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Student Learning Styles and Use of Study Techniques

by

Sally A. Lipsky

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Until recently individual differences were not a contributing factor in the many educational practices applied to students (Kiernan, 1979). However, currently more and more educators are considering individual preferences and tendencies ; that is, learning styles, in the development of instruction. There are many researchers in the field of learning styles who indicate that "how a student learns is perhaps the most important factor related to academic achievement" (Dunn, Dunn, and Price, 1979, p. 419). It would seem that this impact of learning styles on achievement would be especially important in the undergraduate students' study processes. With the proliferation of reading and study skills courses on college and university campuses within recent years, it is becoming increasingly necessary for educators to consider learning styles within the context of study approaches. Thus, the purpose of this study is to respond to the following questions:

1. What are the dominant cognitive learning preferences of undergraduate students enrolled in a college reading and study skills course?

2. How do individual students with dominant learning styles report their use of study skill techniques which were previously taught in the college reading and study skills course?

Definitions

Keefe (1979) defines learning styles as "characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (p. 4). The cognitive behaviors deal with the learners' modes of processing information. As Messick (1976) points

out, it is important to distinquish cognitive styles from abilities. Whereas abilities deal with cognitive content and are valued, cognitive styles tell how students learn and are value differentiated. Keefe (1979) categorizies the many dimensions of cognitive style as being either receptive styles, such as field-independence/dependence; or concept formation and retention styles, such as reflection/impulsivity.

On the other hand, affective styles are motivational processes dealing with either attention styles, such as perseverance and anxiety; or expectancy and incentive styles, such as locus of control, achievement motivation, and the like. Finally, the physiological styles deal with the biological modes of response. For example, variations in sex-related behavior, health-related behavior, and various reactions to the physical environment are all physiological styles.

Learning Styles and the Study Process

Research demonstrates that all of the three components of learning style--cognitive, affective, and physiological--interact to determine the effectiveness of the study process. Entwistle (1979 a.,b.) identifies processes (cognitive) and motivation (affective) as important components determining students' approaches to learning. It is these assorted approaches which can be contributing factors as to why students don't learn. As Gibbs (1979) points out, not only do students often lack the necessary study skills or developmental level to succeed in their undergraduate studies, but learning can also be impeded because students are of different types who invariably choose different approaches, many of which are not effective. Morgan (1980) cites study habits as consisting of individual perceptions, orientation, and approaches to study; in

addition to the content learning outcomes.

Taylor (1980) agrees that the amount students learn depends upon their approaches and perceptions, but adds level of information processing as a vital dimension. Taylor's emphasis on processing level indicates the importance of cognitive style in a study situation, a basis for this research. Added support for research directed at cognitive style's influence on the study process is given by Marton and Svensson (1976). These two researchers conclude that the best way of influencing study skill is by influencing the "cognitive attitude" during the process of learning.

Biggs (1979) also views cognitive and affective styles as being interacting components of the study process. He divides this process of studying into three separate and independent dimensions--utilizing, internalizing, and achieving. Furthermore, these dimensions have strategic, or cognitive, characteristics; as well as the motivational, or affective, components. This study will examine the influence of the cognitive/strategic styles on the utilizing dimension of study.

Cognitive Style's Influence on Study Tasks

Research has been done to assess the influences of undergraduate students' cognitive styles on specific study tasks. For instance, Annis (1979) investigated the effect of cognitive style, defined as field-independence/dependence, on textbook note-taking and subsequent testing. The results indicated a definite disparity between the two types of learners--the field-independents scored better on the assessment of sentences of high-structural importance to the passage the students read and took notes on.

Other research supports the descriptive differences between field-independent (analytical, active, structured) and field-dependent (global, passive, intuitive) learners. Morgan (1981) trained his experimental group in a study technique involving self-assessment and self-monitoring. As predicted, after reading, studying, and being tested on text material, the field-independents in the experimental group performed markedly better than any of the other groups.

This difference between field-independents and field-dependents was not as definite in a study done be Annis and Davis (1978). The authors investigated the effect of the variables of study technique, preference for study technique, review, and cognitive style on a test of recall and recognition. Though the field-independents scored better when using a nonpreferred study technique with no review, there was no other significant difference between the two styles when comparing the other study situations.

Smith and Standel (1981) sought to compare field-independent and field-dependent learners with the success of training of two note-taking methods--paraphrasing and mapping. Although neither of the treatment groups did better than the control group, the results indicated that the field-independents did better than the field-dependents on all of the comprehension test sections. No data from this study signified whether one cognitive style benefited more from one study technique that another.

Though by far most of the research on cognitive style and study techniques has used the field-independent/dependent dimension, other categories of styles have been examined. For example, Eanet (1977)

used impulsive/reflective cognitive styles in her study of a particular textbook study system, called REAP. Though this experimental procedure was found to be no more effective than the SQ3R procedure, or the control group, the impulsive students did show more improvement from pre- to post-tests than did the reflective students.

Svensson (1977) categorized students as being either atomistic--focusing on details, or holistic--focusing on overall meaning. He sought to examine qualitative differences concerning the tasks of reading, understanding, and remembering text materials. After analyzing extensive data, Svensson concluded that holistic students were overwhelmingly more adept at drawing conclusions than were atomistic students.

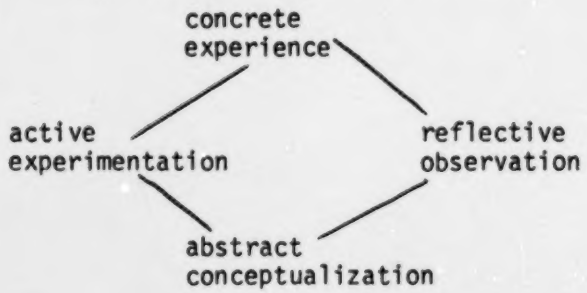
These studies indicate that cognitive styles do have an effect on particular reading and study procedures. However, unlike the above studies which relied mainly on test performance to assess the influence of cognitive styles on study tasks, this study will examine cognitive styles in relationship to students' use of the study tasks.

The Information Acquisition Preference Inventory

Unlike much of the previous research, this study is based on a two-dimensional model of learners' preferred ways of learning and problem solving. The instrument used to assess cognitive style, Gregorc's Information Acquisition Preference Inventory, was adapted from Kolb's work in the area of learning styles.

Kolb (1971) developed what he terms the experiential learning model in which he combined the characteristics of learning and problem

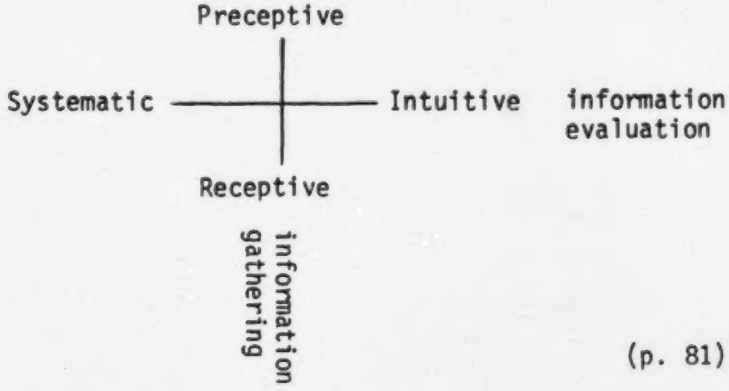
solving into a single process. Kolb conceived of this process as being a four-stage cycle containing active/passive and concrete/abstract elements. These stages are: 1.)concrete experiences, followed by 2.)observation and reflection, leading to 3.) the formation of abstract concepts and generalizations, leading to 4.)hypotheses to be tested in future action; which, in turn, leads to new experiences. Thus, this model is cyclical in nature--recurring continuously.



However, though everyone learns through this four-stage process, Kolb notes that different stages are emphasized by different individuals. No one stage, or mode, of learning is better or worse than another, though various modes are appropriate in various situations. Everybody "develops a learning style that has some weak points and strong points" (p. 28). The goal, of course, is for individuals to become aware of which modes they tend to emphasize and, thus, become more adaptive in different learning and problem solving situations.

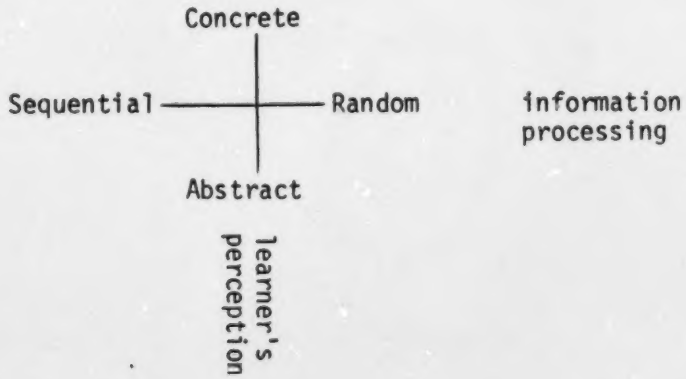
Kolb conceived his model from a managerial standpoint, as did McKenney (1974) with his model of data-gathering and data-processing. The information-gathering continuum; that is, the processes used to organize information, consists of preceptive and receptive individuals. Preceptive thinkers use concepts to focus on relationships between items; whereas, receptive thinkers focus on details. The information evalua-

tion continuum; that is, modes of problem solving, has systematic individuals who use very structured methods or intuitive individuals who have a trial-and-error approach to problem solving. Again, each mode has advantages and disadvantages in various situations where particular tasks are more suited to one cognitive style over another.



(p. 81)

Both Kolb and McKenney have developed inventories to assess the styles described in the models. Gregorc's Information Acquisition Preference (IAP) Inventory (1977) is very similar to the other two inventories, although Gregorc describes his styles from a student/teacher viewpoint. Like Kolb, Gregorc uses the concrete/abstract dimension in his model, but he labels the second dimension sequential/ random, similar to McKenney's systematic/intuitive.



Gregorc and Ward (1977) describe the four distinct learning preference modes as follows:

Concrete Sequential Learner (CS)--derives information from direct, hands-on experience: appreciates order and logical sequence; prefers step-by-step directions and clearly ordered presentations; will defer to authority and guidance; doesn't tolerate distractions.

Concrete Random Learner (CR)--has experimental attitude; can make intuitive leaps in problem solving situations; derives information from trial-and-error approach; likes stimulus-rich environments.

Abstract Sequential Learner (AS)--has excellent decoding skills; lots of conceptual, visual pictures in mind; prefers rational, sequential presentations: defers to authority; low tolerance for distractions.

Abstract Random Learner (AR)--able to sense and interpret human behavior; associates medium with the message; prefers receiving information in an unstructured manner; organizes material through reflection; likes stimulus-rich environment.

Gregorc and Ward maintain that, though everybody naturally uses all four modes, at least 90% of the hundreds of people they have observed expressed a definite preference for one or two modes of acquiring information(p.21) A sample IAP Inventory is attached to the end of this paper. This is a self-report inventory which relies on the students' ranking words descriptive of themselves. The numbers in each of the four columns are then totaled to obtain the score for each preference mode--the first column is CS, followed be AR, AS, and Cr.

Gregorc (1979a) does mention limitations of learning style assessment instruments. First of all, inventories such as these are exclusive and;

therefore, leave out other possibilities. Furthermore, students (wittingly or unwittingly) are able to lie on self-report inventories. Interpretations of words can differ from student to student. In addition, "somestudents have used artificial means of adapting for so long that they report these as 'preferred means of learning'" (p. 235). Thus, instead of natural tendencies being reported, scores represent these artificial styles.

Procedure

A cover letter explaining the purpose of the study, Gregorc's Information Acquisition Preference Inventory, a study skills survey, and a return envelope were sent to 132 students who voluntarily enrolled in the three-credit College Reading and Study Skills Course at the University of Pittsburgh. All of the students who were sent a set of surveys completed one of four fall sections or three winter sections of the course during the 1981-82 school year. In order to ensure as much honesty as possible, the students were requested not to sign their names to the surveys. However, a code number was used to match-up both survey sheets.

Upon return of the surveys, the researcher tallied the IAP Inventory in order to find each student's dominant learning preference. The students were identified as having one dominant style if the highest score in any category was at least two points higher than the next highest category. The students were identified as having double dominant styles if there was a tie or only one point difference between the two highest scores. If this one point difference existed for three or more categories, the students were classified as having no dominant learning preference. Each student's

dominant style(s) was then matched-up with their responses on the study skills survey.

Results

Of the total of 45 students who responded to the surveys, four sets had to be immediately discarded because they were completed incorrectly. In addition, one student, who could not be identified as having a single or double dominant style, was not included in the final sample of 40 students.

The breakdown of the 26 students exhibiting a single dominant learning preference was as follows:

Style	Number	Percent
Concrete Sequential	12	46
Abstract Random	5	19
Abstract Sequential	4	16
Concrete Random	5	19
	Total 26	

The original intention of this research was to identify the sirgle dominant cognitive style of each student enrolled in the study skills courses. However, according to the scoring system set-up to determine learning preference, 14 of the 40 subjects fell into the category of mixed, or double, dominance. Consequently, the researcher was faced with the decision of whether to included the combination breakdowns of the learners in the findings. In order to simplify interpretation of the results, especially in regards to the second research question, the investigator decided to combine the double dominant learners into one large category. Not only will this single category ease the reporting

of data concerning the use of study techniques, but it was also reasoned that these 'mixed' dominant students would skew the results if added to the single categories. Surely the students who exhibit double dominant learning preferences, some of which seemed at odds with one another (such as CS/AR), have unique characteristics--the interpretation of which was considered beyond the scope of this study.

However, it must be noted for future discussion that the double dominant learners formed the following categories:

Style	Number	Percent
CS/AR	5	36
CS/CR	5	36
CS/AS	1	7
AR/AS	2	14
AR/CR	1	7
	Total 14	

The data for the second part of the study--how do individuals with dominant learning styles report their use?--was compiled as follows:

Personal Schedule

Style	Very Little/Never		Sometimes		Always		Total
	number	%	number	%	number	%	number
CS	1	8	6	50	5	42	12
AR	0	0	3	60	2	40	5
AS	1	25	2	50	1	25	4
CR	1	20	2	40	2	40	5
"Double"	1	7	11	79	2	14	14

Cornell Note-taking Technique

Style	Very Little/Never		Sometimes		Always		Total
	number	%	number	%	number	%	number
CS	7	58	3	25	2	17	12
AR	3	60	2	40	0	0	5
AS	3	75	0	0	1	25	4
CR	1	20	3	60	1	20	5
"Double"	5	38	3	24	5	38	13

Textbook Study System

Style	Very Little/Never		Sometimes		Always		Total
	number	%	number	%	number	%	number
CS	2	18	8	73	1	9	11
AR	1	20	3	60	1	20	5
AS	1	25	3	75	0	0	4
CR	0	0	3	60	2	40	5
"Double"	3	23	8	62	2	15	13

Mapping

Style	Very Little/Never		Sometimes		Always		Total
	number	%	number	%	number	%	number
CS	8	73	1	9	2	18	11
AR	5	100	0	0	0	0	5
AS	4	100	0	0	0	0	4
CR	1	20	3	60	1	20	5
"Double"	10	77	3	23	0	0	13

Discussion

The concrete sequential learner is prominent among the students in the sample. Not only are there more than twice as many concrete sequential learners among the students who exhibit one learning preference, but 79% of the double dominant learners have a CS mixture.

However, it is unclear whether the CS learner is representative of the population as a whole, or just indicates those students returning the surveys. As with any research which relies on the voluntary completion of mailed surveys, the sample is going to be biased. One could rightfully argue that the concrete sequentials, who are characterized as being orderly with a deference to authority, would more likely fill-out and return survey sheets.

On the other hand, it might be true that the college reading and study skills classes contain more concrete sequential learners. The students enroll in the course voluntarily, although sometimes with the strong urging of an advisor. Because concrete sequential learners need order in their study environments, they may be more inclined to enroll in a course which would reinforce and emphasize organized reading/study approaches. Experiencing formal, systematic study approaches would certainly appeal to the concrete sequential learner. These types of students would no doubt feel any deficit they have in their study habits much more acutely than the other three learner classifications, and; thus, tend to seek concrete help from coursework. As McKenney points out, "There is a tendency, particularly in late high school and college, for a student to increasingly choose courses that build on his strengths" (1974, p.82).

The fact that 35% of this study's sample show a double dominance indicates a wider area of "strengths" for these students. It could be reasoned that the double dominant students should be more flexible learners and, possibly, more able to adapt to and use study techniques taught in class. However, the results of the second survey sheets--students use of study techniques--do not support this hypothesis.

Before discussing the findings of the study technique usage sheets any further, it must be noted that, because of the small numbers in many of the categories, a difference in one student can result in a fairly large percentage difference. Nonetheless, patterns do emerge from the compilation of data.

To begin with, all types of learners exhibit a higher usage of personal schedules than they do with any of the other three techniques surveyed. However, there is no major difference among the cognitive styles as to how often they use schedules--the majority indicating "sometimes", with "almost always" a close second, except in the case of the double dominant students.

The majority of students in three out of the four single domimant groups use the Cornell note-taking technique "very little or never". However, the majority of the concrete random learners indicate that they "sometimes" use this lecture note-taking technique.

All of the learner categories have a clear majority of students who use a text-book study system "sometimes". This wide majority is also evident concerning the mapping usage for four of the five groups. The concrete random learners once again break the pattern established by the other groups--most of the CR students "sometimes" use the mapping technique.

Again, any discussion of the results of this portion of the study must be viewed within the context of the limited sample size. Certainly the findings would be more meaningful if there were larger numbers involved. However, certain patterns of usage can be concluded from this sample. First of all, all categories of learners--those having single as well as double dominant preferences--report similar amounts of usage of the study techniques. Generally, all use personal schedules "sometimes", with "almost always" a close second. The textbook study system is a definite "sometimes" for all the learner groups. The Cornell note-taking method and the mapping technique are used "very little or never" by most of the cognitive styles. However, one learning style--concrete random--does stand out in relationship to the other styles. The concrete random learners report using the study techniques somewhat more than do the other students. This reported increase in usage is especially apparent with the Cornell note-taking and mapping techniques, and to a lesser degree in the schedules and textbook study system.

It is difficult to explain why concrete random learners report a higher usage of these four rather formal and systematic study techniques. It would seem that concrete random learners would typically shun standardized procedures as being a hindrance to their preferred trial-and-error approaches to problem solving. In fact, it is the concrete random learners who are described as making intuitive leaps in unstructured experiences and, thus, are often chided in structured situations for not showing their steps--all of which seem contrary to the organized study techniques taught in reading and study skills courses. On the other hand, concrete random learners have a

much stronger experimental attitude and accompanying behavior than do the other three learner types. It seems that this experimental characteristic would be essential for students who are expected to change and adapt their techniques of study. Students need to be able to give up former study habits and then be willing to try new techniques and procedures if they are to successfully become more efficient learners. The concrete random learner is most comfortable with trying new procedures--an attitude most likely to lead to the adoption of different habits of study. Thus, it is possible that the pattern of increased study technique usage displayed by the concrete random learners is a result of their trial-and-error approaches and their willingness to experiment.

The findings of both questions addressed in this study hold implications for educators involved in college reading and study skills courses. First of all, both the instructor and the students need to know their styles of learning. This self-awareness can only aid the students in gaining flexibility concerning their study habits. This flexibility needs to be extended to the instructor's presentation of various reading/study procedures. As Gregorc (1979a)himself admits, "Diagnosis of learning style is far from being an exact science. We must, however, continue to diagnose in order to understand more about . . . how people learn."(p. 236) If a typical study skills course attracts more concrete sequential learners, educators must seek ways to recruit and adapt techniques for the other types of learners. After all, the needs of all types of students must be met, especially in a course which teaches skills deemed essential to academic success.

Furthermore, instructors need to adapt teaching methods, as well as course content, to increase the students' usage of various study skills. Techniques based on the strengths of the students, though not exclusively, would seemingly be popular with students. Classroom activities incorporating the experimental trial-and-error approaches so familiar to the concrete random learners are needed. This includes both small group and independent work. The students need to be encouraged to try new techniques and to learn to adapt these techniques to various learning situations.

Certainly continued research needs to be done to verify these conclusions. This research needs to include a larger and more representative sample. Furthermore, another instrument based on a different model of learning styles might be more appropriate, especially a bi-polar model which usually results in more clear-cut findings.

In addition, future studies could examine learning styles, reported use of study techniques, and the students' academic success, i.e. grades, in the study skills courses, as well as the content-area courses. Also, although not included in the original problem of this study, the results indicate a definite disparity among the popularity of the four study techniques. Schedules are obviously the most popular technique and mapping the least. Whether this indicates a difference of emphasis in coursework or a real difference in usefulness to the students is unknown. However, findings such as these have a significance to any instructor of a college reading and study skills course, and would certainly be an area of future exploration.

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STUDY SKILLS SURVEY

Dear Student:

Reflect about your study habits since being taught each of the following skills in L. Com. 10, and then check how often you have used each of the skills. How much have they become a part of your daily study habits? Please, BE HONEST—Do not sign your name.

	very little or never (0-25% of the time)	sometimes (25-75% of the time)	almost always (75-100% of the time)
Personal Schedule			
Cornell Note-Taking Technique			
Textbook Study System (SQ3R)			
Mapping			

LEARNING STYLE

INFORMATION ACQUISITION PREFERENCE INVENTORY

This Inventory is designed to assess your preferred means of gathering information from your environment. These preferences are determined by your ranking the words in the following sets. There are no right or wrong answers. Different words in the lists are equally good. The aim of this Inventory is to identify preference patterns, not evaluate them.

INSTRUCTIONS: There are ten sets of four words listed below. Rank order across each set of four words giving a 4 to the word which best describes you, a 3 to the word which is next most descriptive, and a 2 to the next most word, and a 1 to the word which is least like you. BE SURE TO ASSIGN A DIFFERENT RANK NUMBER TO EACH OF THE FOUR WORDS IN EACH SET. DO NOT MAKE TIES.

EXAMPLE: 0. _____ sun _____ moon _____ stars _____ clouds

Now, please rank order each set of four words.

1.	____involved	____tentative	____discriminating	____practical
2.	____receptive	____impartial	____analytical	____relevant
3.	____feeling	____watching	____thinking	____doing
4.	____accepting	____aware	____evaluative	____risk-taker
5.	____intuitive	____questioning	____logical	____productive
6.	____concrete	____observing	____abstract	____active
7.	____present-oriented	____reflecting	____future-oriented	____pragmatic
8.	____open to new experiences	____perceptive	____intelligent	____competent
9.	____experience	____observation	____conceptualization	____experimentation
10.	____intense	____reserved	____rational	____responsible

FOR SCORING ONLY:

CS_____ AR_____ AS_____ CR_____

by Anthony Gregorc

(Adapted from Kolb, Irwin, and McIntyre, Organizational Psychology: an experimental approach, Prentice-Hall, Inc., 1971).